$$\frac{d([NAD\{Mitochondria\}]\cdot V_{Mitochondria})}{dt} = +V_{Mitochondria}\cdot(k1) + \left(\frac{\frac{Vmax4f\cdot[NAD\{Cytosol\}]}{Kms4} - \frac{Vmax4b\cdot[NAD\{Mitochondria\}]}{Kmp4}}{1+\frac{[NAD\{Cytosol\}]}{Kms4}+\frac{[NAD\{Mitochondria\}]}{Kmp4}}\right) - V_{Mitochondria}\cdot\left(\frac{Vmax6\cdot[NAD\{Mitochondria\}]}{Km6+[NAD\{Mitochondria\}]}\right)$$

$$\frac{d([NAD\{Peroxisome\}]\cdot V_{Peroxisome})}{dt} = +V_{Peroxisome}\cdot(k2) - V_{Peroxisome}\cdot\left(\frac{Vmax1\cdot[NAD\{Peroxisome\}]}{Km1+[NAD\{Peroxisome\}]+\frac{Km1\cdot[NADPH]}{kiNADPH}}\right) - \left(\frac{\frac{Vmax9f\cdot[NAD\{Peroxisome\}]}{Kms9} - \frac{Vmax9b\cdot[NAD\{Cytosol\}]}{Kmp9}}{1+\frac{[NAD\{Peroxisome\}]}{Kms9}+\frac{[NAD\{Cytosol\}]}{Kmp9}}\right) - V_{Peroxisome}\cdot\left(\frac{Vmax2\cdot[NAD\{Peroxisome\}]}{Km2+[NAD\{Peroxisome\}]}\right)$$

$$\frac{d([PAR\{Mitochondria\}]\cdot V_{Mitochondria})}{dt} = +V_{Mitochondria}\cdot\left(\frac{Vmax6\cdot[NAD\{Mitochondria\}]}{Km6+[NAD\{Mitochondria\}]}\right)$$

$$\frac{d([PAR\{Peroxisome\}]\cdot V_{Peroxisome})}{dt} = +V_{Peroxisome}\cdot\left(\frac{Vmax2\cdot[NAD\{Peroxisome\}]}{Km2+[NAD\{Peroxisome\}]}\right)$$

$$\frac{d([NMN\{Peroxisome\}]\cdot V_{Peroxisome})}{dt} = +V_{Peroxisome}\cdot\left(\frac{Vmax1\cdot[NAD\{Peroxisome\}]}{Km1+[NAD\{Peroxisome\}]+\frac{Km1\cdot[NADPH]}{kiNADPH}}\right)$$

$$\frac{d([NAD\{Cytosol\}]\cdot V_{Cytosol})}{dt} = +\left(\frac{\frac{Vmax9f\cdot[NAD\{Peroxisome\}]}{Kms9} - \frac{Vmax9b\cdot[NAD\{Cytosol\}]}{Kmp9}}{1+\frac{[NAD\{Peroxisome\}]}{Kms9}+\frac{[NAD\{Cytosol\}]}{Kmp9}}\right) - V_{Cytosol}\cdot\left(\frac{Vmax7\cdot[NAD\{Cytosol\}]}{Km7+[NAD\{Cytosol\}]}\right) - \left(\frac{\frac{Vmax4f\cdot[NAD\{Cytosol\}]}{Kms4} - \frac{Vmax4b\cdot[NAD\{Mitochondria\}]}{Kmp4}}{1+\frac{[NAD\{Cytosol\}]}{Kms4}+\frac{[NAD\{Mitochondria\}]}{Kmp4}}\right)$$

$$+V_{Cytosol}\cdot\left(\frac{Vmax11\cdot[NMN\{Cytosol\}]\cdot[ATP]}{KmNMN\cdot KmATP+[NMN\{Cytosol\}]\cdot KmATP+[ATP]\cdot KmNMN+[NMN\{Cytosol\}]\cdot[ATP]}\right)$$

$$\frac{d([NADPH]\cdot V_{Peroxisome})}{dt} = -V_{Peroxisome}\cdot\left(\frac{Vmax5\cdot[NADPH]}{Km5+[NADPH]+\frac{Km5\cdot[NAD\{Peroxisome\}]}{kiNADpex}}\right)$$

$$\frac{d([NMNH]\cdot V_{Peroxisome})}{dt} = +V_{Peroxisome}\cdot\left(\frac{Vmax5\cdot[NADPH]}{Km5+[NADPH]+\frac{Km5\cdot[NAD\{Peroxisome\}]}{kiNADpex}}\right)$$

$$\frac{d([ATP]\cdot V_{Cytosol})}{dt} = -V_{Cytosol}\cdot\left(\frac{Vmax11\cdot[NMN\{Cytosol\}]\cdot[ATP]}{KmNMN\cdot KmATP+[NMN\{Cytosol\}]\cdot KmATP+[ATP]\cdot KmNMN+[NMN\{Cytosol\}]\cdot[ATP]}\right)$$

$$\frac{d([NMN\{Cytosol\}]\cdot V_{Cytosol})}{dt} = -V_{Cytosol}\cdot\left(\frac{Vmax11\cdot[NMN\{Cytosol\}]\cdot[ATP]}{KmNMN\cdot KmATP+[NMN\{Cytosol\}]\cdot KmATP+[ATP]\cdot KmNMN+[NMN\{Cytosol\}]\cdot[ATP]}\right)$$